ATTACHMENT

DEQ's Specific Comments
Draft Groundwater Source Control Final Design Report
NW Natural GASCO Site, Portland, Oregon
Dated May 2011

September 22, 2011

Introduction. As indicated in our General Comments, DEQ does not consider the Revised Interim Design Report to be a 100% submittal ready for construction.

Section 1.1. Appendix B is incomplete and should include copies of DEQ's letters dated August 9, 2010 and October 27, 2010. In addition, the appendix should include an e-mail from Bob Wyatt to Jim Anderson dated January 3, 2011 indicating final agreement on dispute resolution conditions arising out of NW Natural's acceptance of DEQ's proposal.

Section 1.2. DEQ's General Comment on the groundwater SCMs RAOs apply here.

Section 1.3. According to NW Natural, "…construction of the extraction wells would not restrict future riverbank cleanup options." DEQ will require the extraction wells to be constructed in such way so as not to restrict uplands remedial action alternatives, including but not limited to soil and MGP waste excavation and removal. The timing and construction f the Fill WBZ trench is discussed in General Comments.

Section 2.1.1. DEQ's comments to Section 3.2.1.1 apply here.

Section 2.1.2. In addition to materials listed in the first sentence of the section and depending on location, the Fill WBZ is made up of varying proportions of MGP waste, including spent oxide material, lampblack, carbon pitch, tar, and/or oil. For example, in the northern portion of the NW Natural Property, the Fill WBZ material includes spent oxide material.

Section 2.1.3. To date documentation of the changes made to MODFLOW model due to testing pilot extraction wells PW-7-93, PW-8-39, PW-8-68, and PW-9-92 has not been provided to DEQ. In addition, DEQ's general comments regarding long-term operation of the HC&C system apply here.

Section 2.1.3.1. NW Natural's discussion of the deeper Alluvium WBZ aquitard (deeper aquitard) is presented in this section. As indicated in the Interim Design Report, NW Natural relied on observations made during drilling of shoreline monitoring wells and Targost® logs to develop interpretations of the depth, thickness, and lateral extent alluvial sediments, including the deeper aquitard. DEQ understands interpretations involving Targost® borings were actually based on data generated by the cone-penetrometer tool (CPT). DEQ further understands that prior to use on the NW Natural property, the Targost® probe and CPT were advanced adjacent to previously drilled and visually logged borings for comparison and correlation purposes.

Consistent with the March 29th letter and for clarification, DEQ is requesting NW Natural to document the work done to correlate the CPT logging data to drilling observations, and describe how this information was used to interpret the stratigraphy at each of the Targost® borings. NW Natural should provide copies of CPT logs, comparisons of subsurface observations with corresponding CPT logs; and correlation criteria for assigning material types to the CPT logs. DEQ is particularly interested in the

criteria used to interpret the presence of the deeper aquitard. This information should be provided in the Draft Final Groundwater SCMs Design for DEQ's information and for completeness.

Section 2.1.4, 2nd paragraph. Regarding offshore investigations, NW Natural indicates, "DNAPL was not detected in any of the borings below an elevation of approximately 17 feet COP." The referenced elevation should be revised to "-17 feet COP." In addition, evidence of DNAPL was found at Boring GS-09 at an elevation of approximately -25 feet COP. For example, see Figure 3 or figures 5-F1 through 5-F5 of the Groundwater/DNAPL FFS.

The combination of figures 2-12a through 2-12c and figures 2-13a and 2-13b provide good illustrations of groundwater contamination migrating offshore and under the river. That said the subsurface distributions of free and total cyanide shown by figures 2-13a and 2-13b rely on interpretations of data collected from nearshore borings GS-01 through GS-12. These borings are located between 75 and 125 feet downgradient and under the river from where monitoring wells and extraction wells are located. In addition, the groundwater data shown represent one-time reconnaissance samples collected during drilling in the fall of 2007. As indicated in our March 26, 2010 letter regarding the Interim Design Report, figures should be prepared that are representative of uplands groundwater data where source control will occur. Figures for free cyanide and total cyanide should be prepared along a cross-section corresponding to figures 2-3a through 2-3c (i.e., the cross-section containing uplands control, monitoring, and extraction wells). Similar figures were previously prepared by NW Natural for the Groundwater/NAPL Pilot Program Report[1] (see figures 5c and 5e).

In addition, it is unclear why figures 2-13a and 2-12b only show data for free and total cyanide. DEQ understands total cyanide is a widely distributed MGP chemical of interest (COI). However, as NW Natural indicates in Section 3.2.1.1 that benzene, toluene, and naphthalene are also widely distributed and generally representative of MGP COI. Groundwater in the uplands along the shoreline is also impacted by chlorinated volatile organic compounds (cVOCs) due to releases caused by Siltronic. For completeness, figures should be prepared for additional COI, including benzene, naphthalene, toluene, cis-1,2-dichloroethene, and vinyl chloride along a cross-section containing uplands control, monitoring, and extraction wells. As done previously, NW Natural should use reconnaissance groundwater data as needed to fill data gaps.

Section 3.1.1. DEQ's general comment regarding RAOs applies here.

Section 3.1.1.1, last paragraph. In addition to pointing out free cyanide was not detected in surface water samples, the paragraph should indicate total cyanide was detected in three samples at concentrations ranging from 10 micrograms per liter (ug/L, or parts per billion) to 140 ug/L.

Section 3.1.2. For clarification, although the National Pollutant Discharge Elimination System (NPDES) permit application was submitted to DEQ in February 2011, the application was not complete until the Land-Use Compatibility Statement was received by DEQ in May 2011. In addition, during review of the NPDES permit application and Revised Interim Design Report; DEQ requested information via e-mails sent April 14, 2011 and August 17, 2011 on NW Natural's proposed approach for conveying treated water to the river. As indicated in DEQ's general comments, the approach for discharging treated water to the river is an important component for the SCMs design and NPDES permit application. NW Natural replied to DEQ's e-mails on August 29th. DEQ understands NW Natural intends to pipe treated water to the river and request a mixing zone for the discharge, both of which will require additional information to

[1] Anchor QEA, LLC, 2007, "Groundwater/NAPL Pilot Program Extraction Well and Performance Evaluation Design Report," May, a report prepared for NW Natural.

supplement the NPDES permit application and may involve additional state and federal permits. The Draft Final Groundwater SCMs Design should include NW Natural's proposed outfall design.

Section 3.1.3. This section of the Revised Interim Design Report indicates that when an extraction well is shut-down for maintenance the flow rates of adjacent extraction wells will be increased to maintain hydraulic capture. NW Natural should discuss this situation in the context DEQ's general comments on the long-term operation/effectiveness of the HC&C system and DNAPL movement. DEQ is concerned increasing flow rates during extraction well maintenance and/or replacement could cause excessive drawdown in the upper Alluvium WBZ extraction wells and increase DNAPL mobilization in the portion of Segment 1 where DNAPL occurs. Under this scenario and depending on the shut-down time, maintaining extraction well discharges to sustain operation and minimize potential DNAPL movement may be preferred.

Section 3.1.3, last paragraph page 14. NW Natural indicates backup generators will be available in the event of a PGE power failure. Given the potential for flooding at the site and the extenuating circumstances associated with flooding, including system shut-down, NW Natural should clarify whether backup generators are intended to keep the HC&C operating under these conditions.

DEQ acknowledges NW Natural's plans for responding to HC&C system shut-downs caused by equipment (e.g., pumps available onsite; backup generators) and agrees an assessment of water quality changes under selected shut-down scenarios is no longer warranted.

Section 3.2.1.1, 1st paragraph. NW Natural indicates DEQ required a series of investigations to be conducted in the Willamette to, "…determine the nature and extent of contamination in offshore groundwater and river sediments." For clarification, although DEQ did oversee the in-water work referenced by NW Natural and documented in the Offshore Investigation Report[2], DEQ was primarily interested in investigations designed to assess potential ongoing uplands contaminant transport pathways (e.g., direct discharge, groundwater) as sources of contamination to the river and river sediments. This data was incorporated into the Groundwater/DNAPL FFS and the SCMs planning and design process. However, the objective of a significant amount of the work performed during the offshore investigation was supporting the Portland Harbor in-water RI/FS being performed by the Lower Willamette Group under EPA's oversight. Furthermore, off-shore investigatory work supplied surface water, sediment, transition zone water, and shallow groundwater data to assist planning of the in-water sediment project also being overseen by EPA.

Section 3.2.1.1, 6th paragraph. In general DEQ concurs with NW Natural regarding free cyanide bioavailability and toxicity. Although not mentioned in the Revised Interim Design Report, in previous correspondence and meetings DEQ has informed NW Natural that free cyanide data alone is not adequate for assessing potential impacts to the river. As part of planning and designing the treatment system for the groundwater SCMs and during groundwater monitoring, NW Natural evaluated concentrations of "available" and "weak-acid dissociable" (WAD) cyanide. Cyanide in these forms has the potential to convert to free cyanide in the river environment and is being considered in evaluations of the groundwater pathway and treatment system design.

In a memorandum dated August 20, 2010 and for purposes of groundwater monitoring, NW Natural recommends using the only WAD method to assess forms of cyanide with the potential to convert to free cyanide in the river. DEQ does not approve the recommendation based on the information presented. The WAD and available cyanide methods should provide similar results. However, based on the data

[2] Anchor QEA, LLC, 2008, "Offshore Investigation Report - NW Natural 'Gasco' Site," February, a report prepared for NW Natural.

compiled in the August 20th memorandum, the WAD method consistently reports much higher concentrations of WAD cyanide compared to the available cyanide method. If the WAD cyanide results are used to assess the potential concentrations of cyanide which could convert to free cyanide, then the conclusion which flows from the data is the flux of free cyanide being discharged to the river via groundwater is potentially significant.

DEQ considers the difference the two methods to be significant enough to conclude the WAD cyanide values are overly conservative for purposes of the project. DEQ requests the groundwater monitoring program retain analysis of cyanide using the total, available, and free methods. Using the available method also has the advantage that groundwater monitoring data can be compared directly to treatment system influent and effluent data. Also, DEQ understands NW Natural continues to rely on a single laboratory for available cyanide analyses. If this is the case and NW Natural has not already done so, then DEQ requests laboratory splits be run on selected samples to evaluate the performance of the laboratory NW Natural is using. Split sampling should be coordinated with DEQ.

Section 3.2.1.4. DEQ has numerous comments regarding this section of the Revised Interim Design Report which are provided below.

- DEQ believes the first full paragraph at the top of page 20 is incorrect, inconsistent with the information provided in Appendix F, and does not reflect DEQ's understanding of, or involvement in the modeling process. DEQ is willing to discuss development of the MODFLOW further, but this paragraph should be deleted from the Draft Final Groundwater SCMs Design.
- For clarification, DEQ considered simulations using March 27, 2000 data to be representative of a reasonable worst-case scenario where groundwater extraction rates and treatment system flow rates are concerned. The simulations were used in the source control planning and design process to further evaluate the potential maximum extraction rate and treatment flow rate of the HC&C system and treatment system respectively. The simulations completed for this purpose should not be represented as the reasonable worst-case scenario for all situations related to the performance of the HC&C system. For example, to assess seasonal maximum drawdowns in the upper Alluvium WBZ extraction wells would require using a different set of assumptions.
- Documentation of the changes made to the model mentioned at the top of page 21 should be provided, including the reason for extending the model to include U.S. Moorings; the affect the modifications had on modeling results, and a figure showing the hydraulic conductivity values assigned to the upper Alluvium WBZ.
- Further explanation of the nested table of groundwater inflow rates on page 20 is needed. In particular NW Natural should clarify the relationship between the values shown in the table to the extraction rates of wells pumping from the upper Alluvium WBZ and lower Alluvium WBZ; and the flow rates into the interceptor trench and the treatment system. For example, total groundwater inflow to the "Upper Alluvium" and "Lower Alluvium above the Aquitard" is estimated to be 955 gallons per minute. However, the total modeled extraction rate for the Alluvium WBZ HC&C system is 260 gallons per minute (gpm) and the range of treatment design flow rates ranges between 663 and 805 gpm.
- DEQ understands Figure 3-2 is based on the March 27, 2000 water level data. NW Natural should indicate the extraction rates for each well or group of wells shown (e.g., upper Alluvium WBZ and lower Alluvium WBZ). NW Natural should also indicate whether operating the HC&C system under these conditions results in capture zones representative of the covering the minimum, average, or maximum lateral extent.
- Figure 3-2 depicts an Alluvium WBZ HC&C system capture zone in plan-view. According to Section 3.2.2.2.1 (7th paragraph) the figure shows groundwater being prevented from migrating to the river. DEQ considers a single plan-view figure to be inadequate to illustrate HC&C of the Alluvium WBZ over the depth intervals of interest. DEQ requests that additional plan-view figures be

developed for the Draft Final Groundwater SCMs Design to show capture zones at elevations corresponding approximately to the "upper" extraction well screens, the lower portion of the upper Alluvium WBZ, the "lower" extraction well screens; near the top of the deep aquitard; and at the base of the alluvial sequence. In addition, three cross-sectional views of capture zones should be provided through extraction well locations PW-2, PW-6, and PW-9. The corresponding times after HC&C system start-up the capture zone represent should be indicated on all of the figures.

- DEQ understands NW Natural used 10 feet/day as an estimate for the hydraulic conductivity of the Fill WBZ to provide conservative estimates for purposes of planning and designing the interceptor trench. DEQ further understands, NW Natural's estimate of the total groundwater flow intercepted by the trench (20 gpm) is based on modeling and represents a reasonable maximum value under seasonal site-specific conditions. NW Natural should verify these understandings and confirm the 20 gpm estimate in response to DEQ's general comment on trench flow rates.

The results of ongoing transient MODFLOW simulations of the HC&C system should be included in the Draft Final Groundwater SCMs Design. DEQ's general comment on evaluating the long-term operations/effectiveness of the HC&C system also applies here.

Section 3.2.1.5. DEQ understands figures 3-3a and 3-3b depict groundwater gradient components at steady state, while pumping the HC&C system at 260 gpm under the March 2000 water level conditions. NW Natural should identify the cross section locations and indicate what the figures represent (e.g., gradients resulting from HC&C operations during seasonal high groundwater levels).

Section 3.2.1.6, 2nd paragraph. According to NW Natural, the Targost® technology, "…is reliable for the detection of the presence of tar and oil, but cannot differentiate between tar and oil or determine if the material is mobile." DEQ continues to disagree with NW Natural's description of the technology where the alluvium is concerned. Setting the question of differentiating tar and oil aside, based on the material properties of MGP waste and the subsurface geology, DEQ considers the Targost® technology to be a reliable method for identifying mobile DNAPL in the upper alluvium (i.e., below the top of the upper silt unit). Identification of MGP waste below the top of the upper silt unit in the alluvium indicates mobile DNAPL occurs at those depth intervals. That said, DEQ acknowledges Targost® equipment cannot determine whether DNAPL in the alluvium has reached a stable subsurface configuration (i.e., stopped moving) based on a single logging event.

Section 3.2.1.6, 3rd paragraph. DEQ notes that based on Targost® work, interpretations regarding the lateral extent of DNAPL in the Alluvium WBZ shallower than 100 feet below ground surface (bgs) increased from approximately 4 acres to over 10 acres.

Section 3.2.1.6, 4th paragraph. The figures referenced in this section of the interim design report appear to rely on: 1) geologic observations made during the most recently completed geotechnical drilling and monitoring well installation work; and 2) DNAPL intervals identified during Targost® logging work. NW Natural indicates the use of previously prescribed methods (e.g., visual observations during drilling, field UV screening, Targost® logs) provide the basis for determining DNAPL occurrence at a boring location. NW Natural further indicates, "The combined methods for DNAPL detection are considered consistent and accurate."

In addition to the methods mentioned by NW Natural, DEQ considers observations of sheen as providing evidence of the presence of DNAPL. This conclusion is based on observations made at a number of monitoring wells (e.g., WS-11, WS-14) where sheen observed during drilling preceded DNAPL entering the installation. Based on this information, Figures 2-3b and 2-3c, figures 2-5 through 2-8, and figures 3-8 and 3-9 should be revised to show depths intervals where evidence of DNAPL was observed during any uplands drilling work completed in the areas shown in cross-section, including but not limited to borings

B-29, B-55, B-57, B-58, B-59; boreholes at the MW-18, MW-19, WS-11, WS-14, and WS-16 monitoring well clusters; and PW-01-80. These locations are referenced here as visual evidence of DNAPL (e.g., sheen) was observed during drilling and/or DNAPL entered the installation after construction. Drilling observations made during installation of monitoring wells and extractions wells for the Segment 2 pilot extraction tests should be included in the review.

For purposes of groundwater source control planning and design, compiling information regarding DNAPL occurrence on geologic cross-sections is intended to support HC&C system design and development of the performance monitoring program, not better understand DNAPL distribution as NW Natural suggests. As such, the consistency and accuracy of the methods used to interpret DNAPL occurrence is less important than assessing the potential distribution of DNAPL relative to extraction wells and performance monitoring wells. The figures should be reviewed, revised, and resubmitted for the Draft Final Groundwater SCMs Design. Alternatively, a set of cross-sections modified per DEQ's comment could be prepared for this purpose and attached as an appendix.

DEQ previously requested the figures be updated as discussed above in letters dated August 22, 2008 and March 26, 2010, and during meetings on February 3rd and March 3, 2011. As indicated in the General Comments, DEQ considers this a key issue for a developing the performance monitoring plan for DNAPL.

Section 3.2.1.7. NW Natural indicates DNAPL migration estimates are conservative approximations as they do not include capillary forces which would tend to resist movement. As DEQ has indicated in previous comments letters, capillary forces do not influence DNAPL migration to the extent NW Natural implies. Laboratory testing found DNAPL near the shoreline to be of intermediate or neutral wettability (i.e., affect of capillary forces is reduced or limited). DEQ believes observations and measurements of DNAPL occurrence under the former Tar Ponds Area provide a sound technical basis for estimating transport rates, and indicate actual mobility is greater than predictions based on groundwater numerical simulations. This information is an important consideration for monitoring HC&C performance, especially near extraction wells where DNAPL occurrence and hydraulic gradients due to pumping are greatest. The Draft Final Groundwater SCMs Design should acknowledge the results of DNAPL wettability testing near the river.

Section 3.2.1.8. For clarification, DEQ approved NW Natural's proposal to implement DNAPL removal from the former effluent ponds area(s) after construction of the HC&C system (and vertical barrier) in a letter dated June 9, 2009. DEQ's March 26, 2010 comments on the Interim Design Report acknowledged that DNAPL removal and the vertical barrier NW Natural recommended along a portion of shoreline Segment 1 (i.e., where DNAPL occurs) could be evaluated in the uplands FS. The June 2009 and March 2010 letters should be referred to for additional information.

Section 3.2.1.9. According to NW Natural, pumping lower Alluvium WBZ extraction wells PW-7, PW-8, and PW-9, "…has little or no short-term measurable water level effect on nearby wells screened in the overlying Fill WBZ." This information supports DEQ's position laid-out in our general comments that the Fill WBZ interceptor trench should be constructed within the same timeframe as the HC&C system because shallow contaminated groundwater will continue to discharge to the river otherwise.

NW Natural indicates the aquifer properties determined from the Segment 2 pilot extraction well tests have been incorporated in the MODFLOW model for the site. Since the October 2008 revisions, DEQ has not received updated information documenting changes made to the model. As indicated in our March 26, 2010 letter commenting on the Interim Design Report, DEQ expects NW Natural to provide updated documentation regarding the MODFLOW model, including but not limited to:

- Updates and refinements made for the revised interim design, basis for the change(s), and affect on simulations;
- Updated figures showing the current model boundaries and grid spacing;
- Dimension, geometry, and thickness of the deeper aquitard in the model; and
- Hydraulic properties assigned to the model layers including, but not limited to calibrated horizontal and vertical hydraulic conductivity values, and specific yield and storativity values of the Fill WBZ and Alluvium WBZ respectively.

DEQ also requests information on how the model handles water levels in the Alluvium WBZ which are drawn down below the bottom of the upper silt unit (i.e., under these conditions does the model assign a specific yield value to the upper Alluvium WBZ).

Documentation of the most current version of the MODFLOW model being used to simulate hydrogeologic conditions and the Fill WBZ and Alluvium WBZ SCMs should be provided as an appendix in the Draft Final Groundwater SCMs Design. In addition, DEQ requests that NW Natural provide a working version of the model for our information and use.

Section 3.2.2. DEQ's general comments regarding the interceptor trench apply here.

Section 3.2.2.1. DEQ's general comments regarding the interceptor trench apply here.

Section 3.2.2.2.1, 2nd full paragraph page 28. DEQ acknowledges and accepts NW Natural's rational for adding the upper Alluvium WBZ extraction wells to the HC&C system. For clarification regarding Item #4, increasing the number extraction wells in the upper Alluvium WBZ reduces the pumping rates and lateral gradients between installations; however the lateral gradients will be greater than under ambient non-pumping conditions.

Section 3.2.2.2.1, 1st paragraph page 29. NW Natural indicates two factors were used to select the elevation of extraction well screens, including: 1) setting the screened intervals shallow enough to control vertical gradients and reduce the potential for DNAPL mobilization; and 2) placing the wells deep enough to provide sufficient available drawdown for the anticipated range of pumping rates needed for gradient control. To date, DEQ is not aware of NW Natural having actually compared the available drawdowns to the drawdowns predicted based on simulations of the long-term full-scale operation of the HC&C system. As indicated in DEQ's general comments on the long-term operation and effectiveness of the HC&C system, the Draft Final Groundwater SCMs Design should include such an evaluation under seasonal extremes of groundwater levels and river stage and NW Natural's recommended pump placements shown in Figure 3-7b. The comparison should also consider specific capacity estimates NW Natural derived from the extraction well tests previously conducted at the site.

Section 3.2.2.2.1, 2nd paragraph page 29. NW Natural's response to DEQ's comments on placing extraction in the zones of highest groundwater contamination is acceptable.

Section 3.2.2.2.1, 3rd paragraph page 29. NW Natural indicates that, "Based on review of Figure 2-11 and the Segment 3 source control evaluation report, NW Natural does not see a technical basis for extending Segment 1 further on the Siltronic property. With regard to the Alluvium WBZ and adding an extraction well upstream of PW-1, DEQ concurs with NW Natural's conclusion given the information provided in the Revised Interim Design Report.

For the Fill WBZ, groundwater data shown on Figure 2-11c (e.g., cyanide) indicates the length of the interceptor trench shown by Figure 2-2c should be extended beyond WS-8 (i.e., to near the southeastern

end of Segment 1). Extension of the trench should be further evaluated and discussed in the Draft Final Groundwater SCMs Design.

Section 3.2.2.2.1, 1st paragraph page 30. DEQ's comment to Section 3.1.4 regarding capture zone figures applies here.

DEQ understands Figure 3-2 depicts the steady-state capture zone for the Alluvium WBZ HC&C system proposed in the Revised Interim Design Report, pumping at a total discharge rate of 260 gpm, under the March 27, 2000 water level(s) scenario. DEQ further understands that except for the changes listed in Section 3.2.1.4 (top of page 21) and the addition of the deep aquitard for the Interim Design Report, the current version of the MODFLOW model is carried forward from October 2008. NW Natural should confirm these are the only changes made to the model or provide additional clarifying information.

Section 3.2.2.2.1, 2nd paragraph page 30. DEQ requests NW Natural to evaluate adding upper Alluvium WBZ extraction wells at the PW-09 and PW-10 locations (i.e., PW-10U). DEQ believes these extraction wells may be warranted as: 1) the highest concentrations of free cyanide and total cyanide in the upper Alluvium WBZ are detected in the vicinity of the PW-09 and PW-10 locations; and 2) the response to pumping pilot extraction wells suggest the hydraulic influence of deep extraction wells on the upper Alluvium WBZ in this portion of the site may be less than previously thought.

Section 3.2.2.2.1, last paragraph. DEQ acknowledges NW Natural's commitment to adjusting the screened intervals of extraction wells to avoid penetrating fine-grained layers. However, figures 2-3c and 2-11b show the screened interval of extraction wells PW-1L and PW-2L crossing a relatively thick laterally extensive fine-grained layer. NW Natural should revise the figures for the Draft Final Groundwater SCMs Design to show the intended vertical placement of these wells in the context of the geology shown in the figures.

Section 3.2.2.2.2, 1st paragraph. DEQ notes NW Natural recommends constructing extraction wells using six-inch diameter steel casing and wire-wrapped screen. Extraction wells PW-3, PW-7, PW-8, and PW-9 were constructed with 8-inch diameter casing and screen. NW Natural should confirm the recommendation to use 6-inch casing/screen, and provide the rational for reducing the well diameters.

As indicated in the general comments, evaluations of the specific capacities and well efficiencies of the existing pilot extraction wells should be completed and included in the Draft Final Groundwater SCMs Design. Based on this information and groundwater modeling, NW Natural should make recommendations for modifying extraction well designs to improve well efficiency. Optimizing well design and well efficiency is particularly important given DEQ's general comments about maintaining the long-term operation and effectiveness of the HC&C system due to the heterogeneity of the upper Alluvium WBZ, potential lack of available drawdown, and the potential for well fouling discussed in Section 3.2.2.4. Regarding future installations, DEQ expects NW Natural to run sieves on the material to be screened to select the screen slot-size and filter pack gradation for each extraction well prior to construction.

Section 3.2.2.2.2, 2nd paragraph. DEQ believes "DNAPL funnels" are important components of extraction wells, monitoring wells, and "observation wells" located along the portion of Segment 1 where DNAPL occurs. Regarding sealing around the sump, DEQ recommends adding a predetermined amount of slurry to the bottom of the borehole before the well is set in place (i.e., within the outer casing). The amount of sealant should allow for displacement caused by insertion of the well's sump. During placement of the sand pack, in addition to surging the well to settle the sand sealing materials that may have migrated around the funnel and into the sand pack and sump should be removed through bailing.

Section 3.2.2.2.2, 4th paragraph. DEQ acknowledges that depending on material type(s), sonic drilling equipment allows retrieval of much of the material in the interval drilled for purposes of visual observation and sample collection. However, for clarification the sonic method does not typically provide "core" (i.e., intact undisturbed material over the drilled interval) as considerable disturbance occurs during drilling, removing material from the casing, and during bagging of the material. This comment also applies to Section 2.1.4.

Section 3.2.2.3, 5th paragraph. DEQ acknowledges NW Natural's inclusion of DNAPL pumps in the design of upper Alluvium WBZ extraction wells. Certain extraction wells in the lower Alluvium WBZ should also be equipped with the pumps depending on the proximity of DNAPL to the installation (e.g., PW-3-85). Alternatively, NW Natural should discuss the decision framework and time required to add DNAPL pumps to wells where accumulation occurs after construction and system start-up. In addition, there is the potential for DNAPL recovered from extraction wells (e.g., PW-2U/L, PW-3-85) to contain F002 listed hazardous waste. The Draft Final Groundwater SCMs Design should discuss this scenario, including providing material sampling, handling and management procedures.

Section 3.2.2.4, 4th paragraph. DEQ understands using the Aqua Gard system involves a permanent installation on the wellhead and requires a perforated injection pipe to be permanently installed in the extraction well(s). However, it is unclear whether the well-head installation and/or the perforated pipe are incorporated into the well-head design shown on figures 3-7a and 3-7b. The figure should be reviewed and revised as appropriate.

Section 3.2.2.5.2, 1st paragraph. As indicated above, DEQ is not aware of NW Natural having provided documentation of changes made to the MODFLOW model from the Interim Design Report onward. As such, DEQ and NW Natural have different understandings regarding the current status of the "approved" MODFLOW model. This is a matter which should be resolved prior to NW Natural submitting the Draft Final Groundwater SCMs Design.

Section 3.2.2.5.2, 2nd paragraph. DEQ's general comments on the groundwater monitoring plan apply here.

Section 3.2.2.5.2, 3rd paragraph. DEQ believes temperature and specific conductance provide useful information for monitoring the effectiveness of the HC&C system in the Alluvium WBZ. This information can be used to support groundwater elevation and chemistry data. For example, declines in these parameters measured over time provide evidence river water is being drawn towards the uplands. DEQ acknowledges NW Natural's prioritization of collecting water level and temperature data over specific conductance information. However, DEQ believes specific conductance may be a more sensitive parameter for assessing water quality changes than temperature alone. For example, DEQ understands river temperatures fall above and below groundwater temperatures depending on the season. NW Natural should select a representative subset of performance monitoring wells where temperature and specific conductance data will be collected during HC&C operation.

Section 3.2.2.5.2, 6th and 7th paragraphs. According to NW Natural, the programmable logic control (PLC) is designed so a unique elevation delta (ΔH) can be assigned to each control well transducer. DEQ understands ΔH represents the elevation difference between the river and groundwater elevation in the control well. In other words, the delta value controls the magnitude of the hydraulic gradient between the river and the HC&C control wells. The higher the ΔH in a control well, the greater the pumping rate needed at the corresponding extraction well. DEQ further understands ΔH is a critical design parameter whose value must be equaled or exceeded at control wells on an average basis for the HC&C system to be

effective. As such, ΔH values should be selected to ensure the HC&C system maintains gradient reversals throughout the full thickness of the Alluvium WBZ.

NW Natural indicates recommended ΔH values will be provided during the startup process. However, operation of the HC&C system can be modeled using MODFLOW and the gradients needed to fully contain the Alluvium WBZ can be estimated based on the simulated head differences between uplands installations and the river. DEQ requests the anticipated range of ΔH values be provided in the draft final design document as projected performance criteria, refinement of which will be performed during start-up. DEQ expects the ΔH values to be selected to account for and overcome factors not related to operating the extraction wells (e.g., fluctuations caused by river stage, "drift" in transducer readings).

Section 3.2.2.5.2, 7th paragraph. DEQ acknowledges the reasons cited and accepts NW Natural's recommendation to not use monitoring wells below the lower aquitard as control wells. DEQ understands that monitoring wells MW-21-165, MW-18-180, MW-19-180, MW-5-175, WS-14-161, and WS-11-161 will instead be equipped with transducers to monitor water level elevations, assess the influence of the HC&C system below the deeper aquitard, and demonstrate gradient reversal(s) are being achieved and maintained in this zone.

Section 3.2.2.5.2, last paragraph. Piezometers are included in the performance monitoring network to monitor groundwater elevations near and/or under the river. The numbers of existing and proposed piezometers are insufficient to provide water level information across the length of shoreline segments 1 and 2. Two additional piezometer clusters should be constructed offshore from PW-2 and PW-10 locations.

Section 3.2.2.5.3 (Targost Sampling). DEQ's general comments regarding DNAPL monitoring apply here and Figure 3-10 should be revised accordingly. For clarification, DEQ accepts NW Natural's general approach for assessing individual Targost® sampling areas for the presence of DNAPL prior to HC&C system start-up. However, NW Natural should be advised that finalizing the numbers and locations of baseline Targost® logging locations and/or sampling areas is dependent on compiling evidence of DNAPL occurrence on geologic cross-sections.

Section 3.2.2.5.3 (Monitoring and Recovery of DNAPL Entering Wells). DEQ approves NW Natural's recommendation to measure DNAPL in monitoring wells daily for the first week and weekly for the first quarter of operation. However, given the uncertainties associated with DNAPL occurrence and movement and pumping the extraction wells, measurements should continue to be made every other week through the first quarter of HC&C system operation. Adjustments to this schedule will be made based on the first three months of DNAPL measurements and subsequent to DEQ's approval. DEQ acknowledges DNAPL may enter an installation due to its placement and construction and accepts NW Natural's recommendation to monitor DNAPL prior to system start-up to evaluate baseline conditions. Under this scenario DEQ believes the goal for baseline conditions should be to establish to the extent practicable a stable situation in the installation (e.g., minimal or uniform DNAPL accumulation).

Section 3.2.2.5.4. In general, it appears NW Natural's recommendations involve reducing the overall sampling frequency and removing analyte groups from the groundwater monitoring program. The recommendations appear to be based on the amount of existing groundwater data available for the site and the presumption that groundwater data and trends will not be useful in assessing the performance of the HC&C system.

DEQ has numerous comments on the performance monitoring program which are provided below. DEQ's comments are provided in italics following our understandings of NW Natural's recommendations.

- Except for extraction wells, NW Natural proposes collecting samples from all monitoring wells, observation wells, and piezometers, on an annual basis.
  - *Based on the information presented in the Revised Interim Design Report, DEQ does not approve NW Natural's recommendation to reduce the sampling frequency at all monitoring wells, observation wells, and piezometers to annually. Although DEQ acknowledges a significant amount of groundwater chemistry data has been collected at the site, the focus of groundwater data evaluations has been on a very limited subset of COI (e.g., benzene, total low and high molecular weight polycyclic aromatic hydrocarbons [PAHs]). As such, there is insufficient information available to evaluate NW Natural's recommendation. The current approved sampling frequency for existing installations is semi-annual. In addition, the approved approach to sampling new monitoring wells is to collect four consecutive quarters of samples to establish trends before reducing the frequency. Before the frequency of monitoring, the suite of analyses, and/or the list of monitoring wells are changed, NW Natural should provide the technical basis for the recommendation(s), including supporting data evaluations, for DEQ's review and approval.*
  - *Given the HC&C system will alter hydraulic conditions in the Alluvium WBZ, DEQ requests new and existing monitoring wells, observation wells, and piezometers to be sampled within 3-months of treatment system start-up to assess changes in groundwater trends in response to pumping. DEQ believes trends (or changes in trends) in groundwater chemistry will inform evaluations of HC&C system performance. The initial sampling may coincide with semi-annual sample collection or could be conducted as a separate event. The goal of DEQ's recommendation is to collect two sets of groundwater samples for analysis during the first six months of HC&C operation.*
- New monitoring wells will be sampled after installation and annually thereafter. *See comments above.*
- Extraction well samples will be collected and analyzed on a "tiered" basis (i.e., monthly for the first year, quarterly for the second year, semi-annually for the third, fourth, and fifth years, then annually).
  - *DEQ approves this approach under the condition that changes in the sampling frequency will be made based on an analysis of the data collected previously. The data analysis and recommended change in frequency are subject to DEQ's review and approval.*
- All samples will be analyzed for volatile organic compounds (EPA Method 8260), PAHs (EPA Method 8270C selective ion method), WAD cyanide, and free cyanide.
  - *Based on the information presented in the Revised Interim Design Report, DEQ does not approve NW Natural's recommendation to limit the suite of analyses to those listed here for "annual" monitoring events. As mentioned above, there is insufficient information available in the Revised Interim Design Report to evaluate NW Natural's recommendation to modify the approved groundwater monitoring program (e.g., remove metals). Before the frequency of monitoring, the suite of analyses, and/or the list of monitoring wells are changed, NW Natural should provide the technical basis for the recommendation(s), including supporting data evaluations, for DEQ's review and approval.*
  - *Consistent with DEQ's comment to Section 3.2.1.1 (6th paragraph), groundwater samples should be analyzed for total, available, and free forms of cyanide.*
- Field measured parameters will include pH, specific conductance, and oxidation reduction potential (ORP).
  - *DEQ understood turbidity was currently included in the list of field measured parameters being monitored during purging. DEQ does not approve the list of field measured parameters referenced above without turbidity. More than any parameter, turbidity provides information*

regarding the ability of an installation to deliver samples representative of groundwater. This is especially important where COI with a high affinity to organic matter and/or fine-grained material are present, including metals and polycyclic aromatic hydrocarbons. The goal for monitoring well purging prior to sampling should be to achieve a turbidity value of less than 50 NTU.

- Inorganic indicators of river water will be analyzed for during the initial month of operation on a weekly basis, then monthly during the first six months of operation.
  - *DEQ approves NW Natural's recommendation under the condition that changes to the monitoring approach will be based on an analysis of the data collected during the first 6-months of operation. The data analysis and recommended change in frequency are subject to DEQ's review and approval.*
- The combined influent to the treatment system (not all monitoring wells) will be analyzed for "all of the constituents on the groundwater permit discharge list and any constituents that could affect the operation of the extraction/treatment system."
  - *DEQ approves this approach. DEQ also concurs with NW Natural's recommendation to use combined influent data to identify parameters which are an issue for the treatment system, and follow-up by sampling individual extraction well(s). As noted by NW Natural, the final parameter list for combined influent will be based on the NPDES permit.*

Regarding NW Natural's questions about including "all Gasco and Siltronic COIs" in the monitoring program, DEQ believes the comments provided above address this topic.

Section 3.2.2.5.5. NW Natural indicates the "…extraction well system will be instrumented for remote monitoring of water elevation and flow." DEQ expects to be able to access remote monitoring displays and data and be copied on alarm notification e-mails. NW Natural should also further explain the following sentence and discuss operational implications:

> "The system will have automatic alarms that will be triggered for water level changes outside of the set point differential level in the control wells and for sustained extraction well pump shutdowns."

DEQ additionally understands the extraction wells and treatment system will be equipped with automatic alarms. NW Natural should confirm this understanding and clarify whether control wells will also be equipped with alarms alerting system operators the ΔH values are not being met.

Section 3.3. NW Natural proposed DEQ expedite review of the treatment system design with the goal of approving the system by the middle of June 2011. DEQ became aware of the mid-June timeframe during our review of the Revised Interim Design Report. DEQ informed NW Natural by telephone on June 6, 2011 the proposed timeframe for approving the treatment system would not be met because the design needed to be reviewed in the context of new SCMs design elements, including the interceptor trench and the re-designed portion of the HC&C system along Segment 1.

The Interim Design Report presented a water treatment system with a maximum treatment plant flow rate of approximately 400 gpm. The treatment system in the Revised Interim Design Report is based on a "maximum day flow" of 619 gpm. Except for the potential groundwater flows from U.S. Moorings; DEQ understands the treatment system in the Revised Interim Design Report includes the same sources of water as the interim design (i.e., flows from the HC&C system, treatment system process return flows, and the Fill WBZ including the LNG basin). NW Natural should further discuss sources of water to the treatment system and explain the difference in treatment plan flow rates between the two design documents.

Section 4. NW Natural informed DEQ by e-mail on August 29, 2011 of its intent to convey treated water into the river via an outfall. NW Natural should be advised this section of the revised interim design does not identify state and/or federal permits that may be required for this work. DEQ expects NW Natural to identify all permits required to install the wastewater outfall in the Draft Final Groundwater SCMs Design.

Section 5. DEQ's general comments on the interceptor trench and specific comments to Section 3.3 apply here.

Table 3-2. Information regarding all of the aquifer tests completed at the site should be included in the table, included the specific capacities and well efficiencies for each of the wells tested.

Table 3-4. The table should clearly indicate the extraction well(s) associated with each control well. All monitoring wells within the portion of shoreline Segment 1 DNAPL occurs should be checked for DNAPL on a monthly basis for the first year of the HC&C operation. In addition, extraction well PW-2L should be monitored for DNAPL.

Table 4-1. Given NW Natural's decision to discharge treated water to the Willamette River via an outfall this table will likely be modified to reflect the need for additional permits.

Figure 1-2. Property and/or leasehold boundaries should be added to the figure for completeness.

Figure 2-8. Evidence of DNAPL at GS-09, shown on figures in previous submittals at a depth of approximately -25 feet COP should be added to the figure. DEQ considers the figure to be incomplete without this information being shown.

Figure 2-9b. Equipotential contours based on groundwater water levels measured by Siltronic on May 19, 2010 should be added to the figure completeness. DEQ considers the figure to be incomplete without this information being shown.

Figure 2-14. The interpreted width of the Siltronic cVOC plume should extend beyond the MW-5 monitoring well cluster as detections of cis-1,2-dichloroethene in monitoring well MW-5-100 exceed 300 ug/L.

Figure 3-4a. The description of the large DNAPL body in the fill unit beneath the Koppers, Inc. leasehold and NW Natural's Liquid Natural Gas (LNG) plant is incorrect. As indicated in DEQ's March 10, 2010 comments to the RI Report and Risk Assessment, there is evidence of DNAPL movement laterally to the north and northeast, and vertically downward. Based on the information documented in the March 10th letter, DEQ determined the DNAPL body under the former process areas represents a large mass of material with significant migration potential. The figure should be revised accordingly.

Figures 3-7a and 3-7b. The "Well Flange – Top" details on both figures should be revised to show an access port for the permanent Aqua Gard system piping. In addition, Figure 3-7a should be revised to show a DNAPL funnel at the bottom of the screen interval. However, DEQ notes lower Alluvium WBZ extractions wells may be equipped with DNAPL funnels as well.

Appendix E, Treatment Plant Design

DEQ does not approve the treatment plant design without information being provided about waste stream identification and management. Although Drawing FD-1 appears to show each waste-streams generated in the water treatment process, identified the type of waste media (vapor, solid, liquid), and provides

estimates of annual volumes; DEQ's March 26, 2010 letter commenting on the Interim Design Report requested NW Natural to determine the regulatory status of each waste-stream (solid waste, hazardous waste), provide the basis for the regulatory determination (e.g., regulatory citation, knowledge of process, sampling data), and a plan for managing the material(s).

DEQ's comments and questions on the treatment plant design are provided below.

- DEQ understands sludge and water were produced during the treatment system pilot study and were managed consistent with DEQ's March 27, 2008 letter regarding investigation derived waste. As requested in our March 26, 2010 letter commenting on the Interim Design Report, NW Natural should provide documentation regarding solids IDW management for DEQ's information and completeness.
- The treatment plant is designed on Max-Day flows (619 gpm), but process pumps are sized for Max-Hour flows (805 gpm). NW Natural should clarify how treatment processes can operate effectively above their design flow rates, or if there is enough storage within the plant to never operate any of the treatment processes above 619 gpm. For example, are the 21,000-gallon air stripping tanks going to be used to equalize flow and manage potential Max-Hour flow rates?
- The air sparging tanks will oxidize some metals as a consequence of elevating the pH and due to air sparging. DEQ expects this material to be identified and characterized for purposes of the treatment system waste-stream determination, including volume estimates.
- The contained-in concentrations listed in Table 2 do not apply to treatment system sludge(s). Environmental media, including soil, sediment, and groundwater contaminated by releases from Siltronic's Former UST System, are impacted by an F002 listed hazardous waste. Solid waste such as treatment system sludge, with detectable concentrations of cVOCs resulting from the treatment of groundwater containing cVOCs is a mixture of a solid waste and a listed hazardous waste and should therefore be managed as hazardous waste.
- Manufacturer's information should be provided for the polymers proposed for use in the treatment system. NW Natural should also indicate whether they are different from those used in the pilot test.
- NW Natural proposes to use a composite sampler to collect samples of treatment plant effluent for analysis; however the rate and frequency of the sampling and the analyte list are not specified. NW Natural should note the rate and frequency and analyte list must be consistent with the NPDES permit.
- NW Natural's basis for selecting hydrogen peroxide or sodium hypochlorite in the cyanide destruction process should be provided. In addition, NW Natural should clarify whether sodium hypochlorite has been tested with site groundwater previously.
- The Max-Day flow rates shown in the Appendix A mass balance table total 668 gpm, which does not agree with the Max-Day flow rate of 619 gpm in Table 1. NW Natural should review this information, reconcile the values, and revise the appendix or table accordingly. DEQ notes the Table 1 value is referenced in the Section 3.3 of the Revised Interim Design Report. As such, changes to the table should also be made to the main body of the Draft Final Groundwater SCMs Design.
- DEQ requests clarifying information on what the "Initial" column represents in the mass balance table.
- Oil water-separators are not shown on Drawing FD-1 in Attachment B. NW Natural should include the units in the process flow diagram, including their associated daily quantities; or provide the basis for not showing them on the drawing.
- Drawings FD-2, FD-3, and FD-7 in Attachment B should be revised to include air stripping vapor-phase carbon treatment units.
- Drawing FD-3 shows that pretreated water from Siltronic may be introduced into the NW Natural air stripper instead of after the air stripper. From DEQ's review of the treatment system design this appears to the only place in the document where this possibility is indicated. NW Natural should confirm the correctness of the drawing and if so, describe under what conditions this might occur.

- Drawing FD-4 appears to show vapor venting from the CN destruct tanks into the treatment building's interior atmosphere. Alternatively, the drawing may show vapor venting to outside air. Clarification should be provided, and in either case NW Natural should explain how hydrogen cyanide in vapor has been considered in the design.
- The pH adjustment step using sulfuric acid after the CN destruct tank appears to be missing on FD-4 and FD-7. The drawings should be reviewed and revised as appropriate.

Appendix J, Fill WBZ Interceptor Trench Design and Drawings

Excavation Limits. The stability of the trench should be evaluated along an alignment set-back from the top-of-bank and near the extraction wells.

Sheet Sections. Manufacturer's information and specifications for the Shoreguard CL-9900 Rigid Vinyl Sheet Piling should be provided in the design package. A detail showing the joint between panels of the vinyl sheet pilings should also be provided with information indicating whether the joint is sealable and if so by what method(s).

Clay Barriers. The clay barriers must be compatible with MGP tar and/or oil likely to be encountered along the trench alignment. Documentation of compatibility through laboratory testing and material specifications should be provided.

Excavation. Manufacturer's information and specifications for the "Bio-Polymer" should be provided in the design package. During trench construction excavated materials are recommended for off-site removal and disposal. A contaminated material management plan for the project will need to be prepared and submitted to DEQ for review and approval as part of the construction documents package.

Alignment. The alignment and sequence trench construction should be evaluated consistent with DEQ's general comments.

Drawings S1, S2, and S3. According to Section 3.2.2.1 of the Revised Interim Design Report, the interceptor trench is intended to fully penetrate the fill unit and capture all of the groundwater in the Fill WBZ. The "Geotechnical" section of the Appendix J indicates that, "Below a thick layer of manmade fill the native soils consist of alternating layers of silt - saturated, loose to medium dense, sand and silty sand. The profile for the interceptor trench was selected on the basis of the interpreted contact between the manmade fill and the initial layer of native SILT and SANDY SILT." Drawings S1, S2, and S3 indicate the bottom of the trench will be set just below the contact between the "Bottom of Existing Fill" and the "Top of Sand." The drawings should be reviewed against the design criterion for the trench profile. Documentation of the material type along the bottom of the proposed trench alignment should be provided in the appendix and the alignment should consider DEQ's general comments.

Appendix K – Well Construction and Development Plan

Section 2. This section should be modified for the draft final submittal to reflect DEQ's comments made to the main body of the Revised Interim Design Report, including our general comments and specific comments regarding Section 3.2.2.2.2.

Section 3. Besides pH, specific conductance, and temperature, and consistent with our comments to Section 3.2.2.5.4 of the Revised Interim Design Report, DEQ expects turbidity to be monitored during observation/monitoring well development. More than any other field measured parameter, turbidity provides information regarding the ability of an installation to deliver samples representative of groundwater. This is especially important where COI with a high affinity to organic matter and/or fine-

grained material are present, including metals and polycyclic aromatic hydrocarbons. The goal for monitoring well development should be to achieve a turbidity value of less than 50 NTU.

Section 4. For clarification, NW Natural should manage soil and water investigation-derived waste (IDW) with detectable concentrations of cVOCs associated with releases from the Former UST System with DEQ's involvement and consistent with DEQ's March 27, 2008 letter. The March 27th letter lays-provides procedures for managing soil and water IDW contaminated by MGP constituents and/or cVOCs on the NW Natural and Siltronic properties. DEQ's April 8, 2010 letter discusses managing IDW contaminated only by MGP waste or constituents.

NW Natural should be advised the procedures for managing, handling, and disposing of contaminated environmental media, is subject to change in the future. As part of planning for the Gasco Sediment Project, a Special Waste Management Plan (SWMP) will be prepared to establish criteria and procedures for managing and disposing contaminated soil and/or sediment offsite. The SWMP is being developed because future uplands and in-water removal/remedial actions have the potential to produce large volumes of contaminated material which could be managed through offsite disposal in state-permitted landfills that meet Subtitle D liner requirements. Furthermore, depending on the constituents present and their concentrations, offsite management could involve special handling of contaminated media (e.g., treatment) prior to disposal.

Appendix O – Sampling and Analysis Plan

Section 3.1. Consistent with DEQ's comments to Section 3.2.2.5.4 of the Revised Interim Design Report, DEQ expects turbidity to be monitored during observation/monitoring well purging. Prior to collecting samples for analysis, the goal for purging should be to achieve a turbidity value of less than 50 NTU. DEQ also expects ORP to be added to the list of field parameters for consistency with Section 3.2.2.5.4.

NW Natural indicates that, "After the water quality parameters have stabilized, the sample will be collected directly from the dedicated tubing or disposable bailer into the sample container." Additional information should be provided regarding actual sample collection procedures, including but not limited to descriptions of which samples will be collected using dedicated tubing or disposable bailers, and methods used for transferring samples from sampling equipment to containers. For example, will cVOC samples be collected from the bailer, and if so will the bailer be equipped with a bottom check-valve (preferred) or will the sample be poured from the top.

Section 4.1. DEQ understands from Section 3.1 that dedicated or single-use sampling equipment will be used for sample collection. This section suggests this might not be the case as groundwater sampling equipment is discussed in terms of being decontaminated. NW Natural should clarify this information. Given the significance of groundwater contamination at the site and potential presence of DNAPL and/or sheen in monitoring wells, DEQ recommends that NW Natural rely on sampling equipment dedicated to an installation or single-use disposable bailers or tubing to the maximum extent practicable.

Section 5.3.2.1.3. DEQ recommends that if ice is used to cool samples during shipping, the ice be placed in durable sealable plastic bags to prevent leakage during transport. In addition, NW Natural should clarify whether a thermometer will accompany samples in each shipping container, or whether the laboratory will measure sample temperatures after receipt.

Section 5.3.2.1.4. NW Natural should confirm DEQ's understanding that field quality assurance samples will be collected daily during sampling events.